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A REABILITAÇÃO DA PESSOA APÓS COVID-19: INTERVENÇÃO DO ENFERMEIRO ESPECIALISTA EM ENFERMAGEM DE REABILITAÇÃO

THE REHABILITATION OF THE PERSON AFTER COVID-19: INTERVENTION BY THE SPECIALIST NURSE IN REHABILITATION NURSING

LA REHABILITACIÓN DE LA PERSONA POST COVID-19: INTERVENCIÓN DE LA ENFERMERA ESPECIALISTA EN ENFERMERÍA DE REHABILITACIÓN

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RESUMO

Introdução: Tem sido crescente a evidência da reabilitação da pessoa após COVID-19 devido ao seu impacto no desempenho das AVD. A reabilitação destas pessoas centra-se no alívio da sintomatologia, melhoria funcional motora e respiratória e ensino de estratégias de conservação de energia.

Metodologia: Foi feita uma revisão narrativa da literatura através de todas as bases de dados da EBSCOhost Web e de pesquisa livre no GOOGLE SCHOOLAR, com inclusão das monografias de relevo evidenciadas nos artigos consultados.

Resultados e Discussão: O treino de exercício deve contemplar atividades como exercícios respiratórios, treino de AVD, treino de flexibilidade, treino de equilíbrio e/ou a caminhada ligeira. Posteriormente, promove-se a atividade física (AF) de baixa intensidade, progredindo para AF moderada e treino de resistência muscular. Por fim, integra-se o treino funcional e de coordenação.

Conclusão: A gestão da fadiga e da intolerância à atividade podem ser alcançadas através de treino de exercício gradual, estruturado, individualizado e doseado.

Descritores: COVID-19, Reabilitação, Treino de Exercício, Enfermagem de Reabilitação

ABSTRACT

Introduction: There has been increasing evidence of people's rehabilitation after COVID-19 due to its impact on ADL performance. The rehabilitation of these people focuses on relieving symptoms, improving motor and respiratory function and teaching energy conservation strategies.

Methodology: A narrative review of the literature was carried out through all databases on the EBSCOhost Web and free search on GOOGLE SCHOOLAR, including the relevant monographs evidenced in the consulted articles.

Results and Discussion: Exercise training should include activities such as breathing exercises, ADL training, flexibility training, balance training and/or light walking. Subsequently, low-intensity physical activity (PA) is promoted, progressing to moderate PA and muscular resistance training. Finally, functional and coordination training is integrated.

Conclusion: The management of fatigue and activity intolerance can be achieved through gradual, structured, individualized, and dosed exercise training.

Descriptors: COVID-19, Rehabilitation, Exercise Training, Rehabilitation Nursing

RESUMEN

Introducción: Cada vez hay más evidencia de la rehabilitación de las personas después de la COVID-19 debido a su impacto en el desempeño de las AVD. La rehabilitación de estas personas se centra en aliviar los síntomas, mejorar la función motora y respiratoria y enseñar estrategias de conservación de energía.

Metodología: Se realizó una revisión narrativa de la literatura a través de todas las bases de datos en la Web EBSCOhost y búsqueda libre en GOOGLE SCHOOLAR, incluyendo las monografías relevantes evidenciadas en los artículos consultados.

Resultados y Discusión: El entrenamiento con ejercicios debe incluir actividades como ejercicios de respiración, entrenamiento de ADL, entrenamiento de flexibilidad, entrenamiento de equilibrio y/o caminata ligera. Posteriormente se promueve la actividad física (AF) de baja intensidad, progresando a AF moderada y entrenamiento de resistencia muscular. Finalmente, se integra el entrenamiento funcional y de coordinación.

Conclusión: El manejo de la fatiga y la intolerancia a la actividad puede lograrse mediante un entrenamiento físico gradual, estructurado, individualizado y dosificado.

Descriptores: COVID-19, Rehabilitación, Entrenamiento físico, Enfermería de rehabilitación

INTRODUCTION

In the last four years, there has been a major change worldwide in the context of health, with social and economic impact. In December 2019, the first reports of an atypical pneumonia of unknown cause emerged in Wuhan province, China, leading to the discovery of a new coronavirus(1). Despite efforts to contain this growing health problem, cases emerged across the globe, leading the WHO[1] on March 11, 2020, to declare the new coronavirus infection a pandemic, given its global impact on health, society and the economy (2).

Studies reveal that 50 to 70% of individuals hospitalized due to SARS-CoV-2[2] or COVID-19 infection maintain symptoms up to 3 months after discharge and 25 to 50% of individuals without hospitalization still have symptoms one month after diagnosis(3). Also in line with this evidence, FAIR Health(4) demonstrates that around half of patients hospitalized for COVID-19 present at least one symptom suggestive of post-COVID after one month of infection, with asymptomatic individuals being around 19% and in those with symptoms around 28%.

More recently, a direct relationship was demonstrated between the severity and quantity of symptoms in the acute phase and functional limitations after infection, demonstrating that 20 to 30% of people report limitations in performing ADL[3] eight months after infection(5–7) .

On the other hand, the persistence of symptoms after the acute phase of the disease may be associated with age(8–11), previous comorbidities, such as obesity, asthma or cardiac pathology(8,11), with the need for hospitalization(10) and with the female sex(9,10).

Some mechanisms potentially involved in the development of post-COVID symptoms include: consequences of acute injury by SARS-CoV-2 in one or multiple organs; persistent reservoirs of SARS-CoV-2 in certain tissues; reactivation of neurotrophic pathogens, such as herpesviruses, under conditions of COVID-19 immune dysregulation; virus interactions with host microbiome/virome communities; clotting problems; dysfunctional brainstem/vagus nerve signaling; continuous activity of primed immune cells; and autoimmunity due to molecular mimicry between pathogen and host proteins(12).

1 Worldwide Organization
2 Severe Acute Respiratory Syndrome Coronavirus 2
3 Activities of Daily Life

Fernández-De-las-peñas(3) temporally defined the following phases for post-COVID syndromes:

- Transitional Phase, from diagnosis (if asymptomatic or without hospital admission) or hospital discharge up to 5 weeks, whose symptoms are potentially associated with COVID-19;
- Phase I – Post-acute COVID-19 Syndrome, from 5 weeks to 12 weeks;
- Phase II – Long COVID-19 Syndrome, from 12 weeks to 24 weeks;
- Phase III – Persistent COVID-19 Syndrome, after 24 weeks.

Symptoms following SARS-CoV-2 infection have potentially serious functional repercussions, which interfere with the quality of life and work capacity of affected people(13,14). This is grouped into the following systems: neurological (dizziness, changes in memory and attention, confusion), autonomic (chest pain, tachycardia, palpitations), gastrointestinal (diarrhea, abdominal pain, vomiting), respiratory (fatigue, dyspnea, cough, odynophagia), musculoskeletal (myalgias, arthralgias), psychiatric (post-traumatic stress, anxiety, depression, insomnia) and other manifestations (changes in taste or smell, skin rash) (3,15–18). Lopez-Leon(19) states that the most common long-term symptoms of COVID-19 are fatigue, headaches, changes in attention/concentration, alopecia and dyspnea.

More recently, Xie et al.(20) showed that, beyond the first 30 days after infection, individuals after COVID-19 are at increased risk of cardiovascular disease, including cerebrovascular disorders, arrhythmias, heart disease, pericarditis, myocarditis, heart failure and thromboembolic disease. This increased risk was evident among individuals who were not hospitalized and gradually increased according to the need for care during the acute phase.

Additionally, individuals after COVID-19 are at increased risk of changes in mental health/illness, such as anxiety, depressive syndromes, stress and maladaptation, substance abuse, neurocognitive decline and changes in sleep. The risk of mental problems was evident even among those with milder forms of COVID-19, i.e., not hospitalized, and was greater in those who were hospitalized during the acute phase(21).

Regarding post-COVID cognitive changes, a relationship has been demonstrated with neurological/psychiatric symptoms and fatigue during the acute phase, and with neurological, gastrointestinal and cardiopulmonary/fatigue symptoms if present after the acute phase(7). Additionally, memory changes were found in people after COVID-19, with increasing significance associated with the severity of symptoms(22).

According to Davis et al.(23), individuals with Long COVID reported prolonged and multisystem involvement, as well as significant disability. After seven months, many have still not recovered, especially from systemic symptoms and neurological/cognitive complaints, nor have they returned to their previous levels of work and/or would continue to present significant symptoms.

There has been increasing evidence in the area of rehabilitation, especially respiratory and motor, of people after COVID-19 due to its impact on ADL performance and consequently on quality of life(24,25). In the case of Barker-Davies et al.(26), the rehabilitation of a person after COVID-19 should aim to alleviate symptoms and improve motor function and quality of life. For Novak et al.(27), individuals who develop intensive care neuropathy or myopathy after

respiratory failure due to COVID-19 benefit from a functional and nutritional rehabilitation program in the hospital context.

For Demeco et al.(28), Vancea & Spiru(29) and Ogundunmade(30), due to the functional impact of COVID-19, rehabilitation intervention should promote lung and motor functions. Bharati & Sahu(31) refer to the importance of energy conservation strategies, the simplification of work and ADL, as well as the use of support products for the management of chronic fatigue associated with post-COVID.

According to Herrera et al.(32), to manage post-COVID fatigue, an individualized, structured and dosed return-to-activity program should be initiated, including energy conservation strategies. In this multidisciplinary consensus, there is additional reference to a healthy eating pattern and hydration, as well as coordination with appropriate specialists, to resolve underlying health problems, such as pain, insomnia/sleep disturbances or mood problems, which can contribute to fatigue management.

Daynes et al.(33) showed gains in the control of fatigue, dyspnea, physical fitness and cognition through a 6-week rehabilitation program, with 2 weekly sessions, which included aerobic exercises, strength exercises and health education sessions about various post-COVID symptoms. Abodonya et al.(34) also showed benefits in respiratory function, dyspnea, functionality and quality of life with inspiratory muscle training in post-COVID patients after admission to intensive care with ventilatory support. More recently, Nopp et al.(35) in their study also showed gains in the management of dyspnea and fatigue, with improved quality of life, functionality and physical fitness, through a multidisciplinary Respiratory Rehabilitation program.

In the study by Rodríguez-Blanco et al.(36), individuals undergoing strength training and breathing exercises achieved significant improvements in fatigue, dyspnea, perceived exertion and physical status, compared to the control group. The same authors emphasize that the greatest benefits were found for dyspnea and aerobic capacity in the breathing exercise group.

Studies show that immune function improves with regular PA[4], and those who are regularly active have lower incidence, intensity of symptoms and mortality from various viral infections(37). Additionally, regular PA reduces the risk of systemic inflammation, the main cause of lung damage caused by COVID-19(38).

Regarding COVID-19, studies reveal that increasing aerobic capacity has the potential to improve immunological and respiratory functions, with a positive effect on combating infection(39). Additionally, individuals with COVID-19 should perform moderate-intensity aerobic exercise for immunological gains(40).

More recently, studies demonstrate an inverse relationship between physical fitness and hospitalization for COVID-19(41), as well as a relationship between physical inactivity[5] and more significant forms of the disease, i.e., a greater number of symptoms, greater severity and/ or higher mortality(42,43).

4 Physical activity

5 Physical Inactivity is considered non-compliance with the WHO physical activity recommendations for adults, consisting of 150-300 minutes per week of physical activity of moderate to vigorous intensity(70); or, in the American case, at least 150 minutes per week of physical activity of moderate to vigorous intensity(77).

Being a priority area of research, the autonomous interventions of the NSRN in motor and respiratory functions(46), especially with the person after COVID-19, have little evidence, and there is a need for their demarcation and affirmation of their relevance.

METHODOLOGY

A narrative review of the literature was carried out using the terms "COVID-19", "SARS-COV-2", "post-COVID", "rehabilitation", "exercise therapy", "therapeutic exercise", "physical activity", "pulmonary rehabilitation", "physical rehabilitation" through all EBSCOhost Web databases (Academic Search Complete; Businesses Source Complete; CINAHL Complete; Cochrane Central Register of Controlled Trials; Cochrane Methodology Register; MEDLINE Complete; MedicLatina; Psychology and Behavioral Sciences Collection; SPORTDiscus with full text; ERIC; Library, Information Science & Technology Abstracts; and Regional Business News) and free search on GOOGLE SCHOOLAR. Additionally, important monographs highlighted in the articles consulted were included.

RESULTS AND DISCUSSION

CARING FOR THE PERSON AFTER COVID-19

Rehabilitation "comprises a set of knowledge and specific procedures that help people with acute, chronic illnesses or their sequelae to maximize their functional potential and independence", with the NSRN[6] being responsible for designing, implementing and monitoring RN[7] plans, in order to ensure the maintenance of clients' functional capabilities, prevent complications and avoid disabilities(47). For the WHO, it is an integral part of health care, together with health promotion, prevention, curative and palliative care, being a set of interventions aimed at optimizing functionality and reducing disability in individuals, through multidisciplinary work, including health education, therapeutic exercises, medication, support products and environmental, home or work adaptations. The provision of rehabilitation services occurs throughout the continuum of care, in all health contexts(48).

In the initial assessment of the individual, scales and measuring instruments must be used in order to identify the target needs for specialized care, define a care plan, monitor progress and evaluate the results obtained(47). According to Hoeman(49), these tools must be able to assess disability, monitor progress, optimize communication within the team, measure the results obtained, as well as document the gains obtained in the rehabilitation process and consequently in health.

The Functional Independence Measure assesses the individual's degree of functional capacity, through their performance and the need for care to carry out motor and cognitive tasks of daily life. 18 items are evaluated, structured into two subscales – motor (Self-care, Sphincter control, Mobility/Transfer and Locomotion) and cognitive (Communication and social cognition)(50).

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7 Rehabilitation Nursing

To assess muscle strength, the Medical Research Council Muscle Scale (MRC) can be used, which grades muscle strength between 0 (no palpable or visible muscle contraction) and 5 (normal strength)(51). Regarding balance, the Berg Balance Scale can be used, which assesses functional balance, in static and dynamic terms, predicting the risk of falling(52).

Regarding intolerance to activity and ventilation, evidence suggests the Sit to Stand test (STS), which assesses the impairment of gas exchange induced by exercise(53,54); the modified Borg Scale for assessing dyspnea and RPE, allowing real-time assessment of the degree of perceived dyspnea and determining safe limits for training and activities to be carried out(55); and the Modified Medical Research Council Dyspnea Scale (mMRC) to assess the impact of dyspnea on ADL and the results of pharmacological or rehabilitation interventions(56). Regarding the impact of COVID-19 and monitoring symptoms, the Post-COVID-19 Functional Status (PCFS)(57) can be used.

Evidence suggests an early rehabilitation intervention to promote the recovery of people with COVID-19(58) to normalize the breathing pattern and increase the efficiency of the respiratory muscles, as well as to reduce energy expenditure, airway irritation, fatigue and improve or reduce shortness of breath(30).

RFR sessions should be structured to respond to the person's needs, individually and according to the severity of the symptoms(59). In the case of a person with COVID-19, different techniques for the person with COVID-19 described below can be used.

After evaluating the person, PFR[8] sessions can be started with the control and dissociation of breathing times followed by breathing exercises according to tolerance and participation – abdominal-diaphragmatic exercises (global and selective), global ribs using a stick and selective ribs(27,34,40). Due to its benefits in ventilatory and blood gas parameters, as well as in the reduction of dyspnea(60,61), users, especially those hospitalized in intensive care, should be encouraged to position themselves prone according to their tolerance to improve peripheral oxygen saturation.

In addition to breathing exercises, the positioning of the patient in bed must be carried out according to the location of secretions, information obtained through lung auscultation and chest teleradiography, in order to comply with modified postural drainage. As an accessory, compression, vibration and/or percussion are used if there are no contraindications. Finally, coughing should be encouraged to expel secretions mobilized by breathing exercises. When the cough is ineffective, directed coughing should be instructed, assisted coughing performed or the forced expiration or "huff" technique, included in the active cycle of respiratory techniques(62). In some situations, due to the lack of effectiveness of these strategies, it may be necessary to aspirate secretions.

The results of PFR sessions can be expressed through the relief of dyspnea; improvement of the ventilation pattern and blood gas values, as well as peripheral oximetry; and elimination of secretions with radiological evidence and auscultation. To this end, the optimization of prescribed inhaled therapy, namely bronchodilators and inhaled corticosteroids, as well as secretion fluidizers, associated with fluid reinforcement, can have a positive contribution(62).

8 Pulmonary and Functional Rehabilitation

TRAINING PEOPLE AFTER COVID-19

According to Reis & Bule(63), training is seen as a multidimensional process involving knowledge, decision and action. Knowledge is constituted as knowledge based on individual values, influenced by social, cultural and religious factors, changing throughout life. The continuous reconstruction of knowledge conditions action depending on the decision made, its potential and the resources to execute it, in a process that involves the cognitive, physical and material domains.

ADL training consists of the progression of tasks and exercises in complexity and demand, in neurological, motor and cardiorespiratory terms. According to individual capacity, assessed by functional capacity and effort tolerance, ADL training can be carried out through basic activities of daily living or personal care and instrumental activities of daily living or domestic and community activities(49).

During ADL training, especially for people with COVID-19, it is important to establish priorities, together with the person; planning activities, in order to distribute them throughout the day/period and ways to carry them out more easily; and the development of energy conservation strategies, as well as rest periods during ADL(31).

According to the NR[9], the NSRN develops activities that maximize the functional capabilities of individuals and, thus, enable better motor, cardiac and respiratory performance, enhancing performance and personal development(47).

MAXIMIZING FUNCTIONING BY DEVELOPING THE CAPABILITIES OF THE PERSON WITH COVID-19

In this sense, the term maximize refers to giving the highest possible value or leading to the highest degree(64) of the functional capacity of the person being cared for. In turn, functional capacity or functionality refers to autonomy in carrying out daily and fundamental tasks that allow the individual to live alone in their own home(65). Therefore, it can be considered that the EEER's function is to promote movement in a therapeutic way, so that the person obtains maximum independence in the various ADLs.

According to Caspersen et al.(66) and Shephard & Balady(67), PA is considered any body movement, produced by the musculoskeletal system, that results in increased energy expenditure. From the perspective of Johnson & Ballin(68), PA comprises any body movement with energy expenditure above resting levels, including daily activities (such as bathing, dressing), work activities (such as walking, moving loads) and leisure activities (such as exercise, sport).

The benefits of PA are well supported in the literature, supporting that physically active adults have a 30% reduction in the risk of premature death for all causes of death, regardless of gender, age, ethnicity and BMI[10].

If you cannot comply with the recommendations, some daily PA has health benefits. A 20% reduction in the risk of premature death for all causes from 90 minutes of MVPA per week is also seen. In order to obtain a 40% reduction in risk, it would be necessary to accumulate

9 Nursing Order
10 Body Mass Index

420 minutes of MVPA per week. It should be noted that accumulating periods of PA, even if less than 10 minutes, seems to be beneficial for both health and motivational issues, being a good starting point and having an impact on lifestyle changes(69).

Regarding the benefits of PA on the health of the elderly, it should be noted that individuals who comply with the recommendations have less risk of falling and resulting injuries, such as fractures or traumatic brain injury. In the elderly, MVPA[11] and muscle strengthening activities also reduce the risk of physical limitations. Evidence suggests that physically active individuals have an improvement in their physical condition even with chronic disease, namely cardiovascular disease, COPD[12], cognitive decline, Parkinson's, hip fracture, osteopenia and osteoporosis(69).

The WHO recommends that adults and elderly people should accumulate at least 150 to 300 minutes of MVPA per week and incorporate muscle-strengthening activities at least twice a week. It also highlights that performing some PA is better than none and that in the case of the elderly, balance work and fall prevention should be included three times a week(70).

Physical exercise is planned, structured and repetitive PA, with the aim of increasing or maintaining physical fitness(66,67). When the SNRN intervenes with the person receiving exercise training, it is manipulating the person's physical fitness, and consequently the subject's individual capacity to practice PA(66).

Physical fitness, on the one hand, has health-related components such as muscular strength (muscle's ability to overcome resistance); muscular endurance (ability of the muscle to continue exerting force for a prolonged period); endurance and cardiorespiratory capacity (capacity of the circulatory and respiratory systems to supply oxygen during AF); flexibility (range of movement of a joint) and body composition (relative amounts of muscle, fat, bone and other vital parts). On the other hand, physical fitness has components related to motor skills, such as agility (the ability to change the position of the body in space with speed and precision); coordination (ability to use the senses along with body parts in carrying out tasks smoothly and accurately); balance (ability to maintain balance while standing or moving); power (amount of work/energy/force performed per unit of time); reaction time (time elapsed between the stimulus and the beginning of the reaction); and speed (ability to execute a movement within a short period of time)(66).

When planning and prescribing exercise training, the training principles must be taken into account, i.e., the training prescription rules, as well as the training variables, which when combined together appropriately result in training efficiency(71).

The training principles relate to(71):

- Overload, in which the training exercise only promotes changes in the body, if it is carried out with sufficient duration and intensities to trigger the consequent adaptation processes in the body, using training loads greater than homeostasis;
- Specificity, as the changes that occur in the body through training are perfectly directed towards concrete and specific objectives of the particular sport;

11 MVPA – Moderate to Vigorous intensity Physical Activity. PA of intensity >3 MET (Task Metabolic Equivalents) or >5 in CR10(72) is considered.
12 Chronic Obstructive Pulmonary Disease

- Reversibility, given that the effects of training are transient and that logically there are adaptations that last longer than others, with acquisitions that take longer to obtain remaining longer. The decrease in the effects of load adaptation will be greater the more recent and less consolidated the adaptation levels are;
- Progression, as increasingly complex and demanding stimuli must be applied, since those unchanging exercises may cause an improvement over a certain period of time, but their effect decreases if the organism adapts to them, reaching a steady state of adaptation ;
- Recovery that results from the alternation that must exist between the application of the load (effort) and rest (recovery);
- Individuality since there are different and individualized reactions and adaptations to the same stimuli, due to biological and psychological individualization.

The training principles are organized in order to obtain the effect of supercompensation. Overcompensation, or general adaptation syndrome, is the biological phenomenon that makes it possible to create an explanatory model for all training principles. After a stimulus, understood as a training session, fatigue occurs, requiring recovery time for supercompensation to occur, i.e., the relationship between work and regeneration that leads to superior physical adaptation. When ideal recovery times are not allowed and maximum intensity stimuli are constantly applied, exhaustion and decreased performance may occur(71).

According to the ACSM[13], training variables for exercise prescription can be reduced to the acronym FITT where F – Frequency (how regularly); I – Intensity (with what intensity or effort/load); T – Time (duration or how long); T – Type (mode or type of exercises). Furthermore, components such as Volume (V) (total amount of exercises) and Progression (P) (exercise complexity) must also be considered when prescribing individualized exercise (FITT-VP)(72).

To quantify the intensity of PA, several tools can be used. Associated with the task/exercise, intensity can be measured through MET and energy expenditure (kcal.min-1), i.e., by inference from the intensity of the task and the time performed. On the other hand, focusing on the individual and their individual response to exercise, we can use the percentage of maximum aerobic capacity (VO2max), percentage of maximum heart rate or percentage of heart rate reserve. The latter differ in that the reserve heart rate takes into account the physiological adaptation to exercise in terms of the cardiovascular system, by lowering the heart rate at rest. Finally, the Borg Scale can be used, either in its original version (PSE 6-20) or in its modified version (CR 0-10)(72).

Regarding the quantification of intensity when prescribing exercise in people with lung or respiratory problems, the evidence suggests caution when using target heart rate intensities based on predicted maximum heart rate. Due to the variability of lung capacity and potential effects on heart rate of medication to control respiratory symptoms, especially dyspnea, the Borg scale should be used(72,73).

The training session can be divided into three phases – warm-up, fundamental phase and return to calm. The warm-up is considered a transition phase that allows the body to adapt to the physiological, biomechanical and bioenergetic demands of the exercise session, and

13 American College of Sports Medicine

must include activities of light to moderate intensity with motor correspondence to exercises to be performed during the fundamental phase. This period also improves range of motion and can reduce the risk of injury during training. The warm-up time may vary according to the metabolic needs of the training, but a duration of less than 15 minutes is recommended. During the fundamental phase, training exercises may include aerobic, resistance, flexibility and/or sports activities, depending on the specific goals of the exercise session. The fundamental phase of the session can last between 10 and 60 minutes, depending on the intensity. Finally, returning to calm allows the body to return to near-resting levels after the training session. Low to moderate intensity flexibility exercises, such as static stretching, can be included to facilitate relaxation(72).

According to the ACSM(73), no barrier should prevent someone from doing light-intensity PA, since independent living requires a minimum capacity to carry out activities that involve light-intensity aerobic work, combined with strength, flexibility and balance and coordination.

In this sense, it is recommended for aerobic training, 4 to 5 days a week, exercises that recruit large muscle groups with accessible activities (e.g. walking, cycling, gardening) and in the case of people with musculoskeletal problems, the use of the aquatic environment during loaded activities. It should start with any duration, according to tolerance, considering 40 minutes per session or 20 minutes, if a session combined with strength exercises. Initially, start at a self-limited walking speed, at an intensity that allows speech (talk test) and gradually increase to CR10 3-5. Progressively, starting from the self-limited rhythm, over 4 weeks, the time can be gradually increased to 40 minutes each session, as well as the intensity increased as tolerated(73).

Regarding muscular resistance training, the ACSM recommends 2 to 3 days a week, functional exercises, calisthenics (with body weight) or weight training, if the person is interested and/or motivated. Regarding time and in the case of bodyweight exercises or functional exercises, a series should be performed during the TV break. If an external load is used, you can perform a series of 8 to 12 repetitions or until fatigue. To regulate the intensity, initially, e.g., in the Sit-to-Stand perform 8 repetitions, in the elbow flexion (arm curl) perform 8 repetitions with 4 kg, or 50-70% of 1RM[14]. Progressively increase to as many sets per day as tolerated. In the case of weight training, increase to 2 sets in approximately 8 weeks(73).

Flexibility training should focus on the hip, knee, shoulder and neck joints, around 3 days a week. The stretch should be maintained for around 20 seconds and until slight discomfort is felt, without any instability due to the amplitude to be used(73).

The work by Salman et al (44) on the return to PA after SARS-CoV-2 infection refers, in Phase 1, to preparing the individual to return to exercise with breathing exercises, flexibility training, balance training and light walking. (SPE[15] 6-8). In Phase 2, expect to develop low-intensity activity, such as walking, yoga or light housework, in increments of 10-15 minutes per day (SPE 6-11). You can progress to Phase 3 after 7 days and walking for 30 minutes at RSE 11. Phase 3 focuses on moderate-intensity aerobic training and resistance training, through of two 5-minute training blocks, with a 5-minute rest between them, increasing an

14 1RM – One Maximum Repetition, which translates the maximum load potential to be moved in a single repetition.
15 Subjective Perception of Exertion

interval daily and progressing up to 30 minutes daily (SPE 12-14). The person will be able to progress to the next phase after 7 days and when they reach 30 minutes of training per session and feel recovered after an hour. Regarding Phase 4, moderate aerobic activity and muscular resistance are developed

through coordination training and functional training. For every two days of training (SPE 12-14), the person will rest one day, progressing to the last phase after 7 days and when tiredness/fatigue returns to normal. Finally, in Phase 5, regular training prior to infection is recommended (SPE >15).

In the context of exercise training for people after COVID-19 with mild symptoms, it should be considered limiting activity to light (≤3 METs[16] or equivalent) and limiting sedentary periods. If symptoms worsen, rest periods should be increased. Prolonged, exhaustive or high-intensity training should also be avoided(26). On the contrary, Foged et al.(45) showed that individuals with severe symptoms of COVID-19 found high-intensity interval training (HIIT) pleasant and tolerable, and performed it safely.

In the case of patients requiring oxygen therapy, low-intensity exercises (≤3 MET or equivalent) should be initially considered, while simultaneously monitoring vital parameters (pulse, respiration, blood pressure and pulse oximetry). The gradual increase in exercise should be based on symptoms(26).

Returning to the concepts initially discussed about maximizing functionality and framing it in the exercise training prescription, the concept of functional training emerges. In this sense, functional training can be considered as a set of exercises, training methods and strategies, which aim to improve functionality in daily, work or sporting tasks(74).

For Liu et al.(75), there are more gains in functionality when there is a motor correspondence between the training and the task/function, considering functional training a better option for reducing ADL disability in the elderly compared to strength training. . The same authors identified three functional training patterns: based on elements/exercises, based on specific tasks or mixed(75).

Evidence shows that people with respiratory pathology have difficulty performing ADLs involving the upper limbs. In this sense, training of the muscles of the upper limbs and trunk should be reinforced, including aerobic training, using an arm cycle ergometer, and resistance training, using free weights and elastic bands(72,73,76).

Given this evidence, exercises and daily tasks can be used to develop muscular resistance training, with a special focus on functional training. In this way, physical fitness will be developed. Additionally, upper limb exercises can be performed to develop muscular and aerobic resistance.

CONCLUSION

Throughout this review, several interventions such as SNRN were identified and supported for people with COVID-19 in the Rehabilitation process. Therefore, the activities within the scope of caring for people with COVID-19 are briefly identified:

16 Metabolic Equivalent of Task (1 MET = 3,5ml O2.kg-1.min-1).

- Assessment of the risk of changes in motor and respiratory functionality;
- Collection of pertinent information using scales and measuring instruments to assess respiratory and motor functions (Dyspnea Scale [modified MRC], Muscle strength [MRC Scale], Berg Balance Scale, Sit to Stand [STS], Measure of Functional Independence, Post-COVID Functional Status Scale);
- Discussion of risky practices and changes in motor and respiratory function with the person/caregiver and joint definition of strategies to implement, expected results and goals to achieve in order to promote autonomy;
- Design of plans, selection, prescription and implementation of interventions to optimize and/or re-educate function and development of motor and respiratory functional re-education programs;
- Implementation of motor functional re-education and RFR programs;
- Teaching, demonstrating and training techniques to promote independence within the scope of motor and respiratory programs;
- Assessment of the results of implemented interventions.

Regarding the empowerment of the person after COVID-19 infection, the following interventions can be carried out:

- Assessment of the person's functional capacity to perform ADL independently;
- Identification of facilitating and inhibiting factors for carrying out ADL independently;
- Selection and prescription of support products;
- Teaching the person and/or caregiver specific self-care techniques;
- Carrying out ADL training (hygiene, clothing, mobility) with energy conservation strategies, using appropriate support products;
- Promotion of safe environments, including the reduction of environmental risk factors related to changes in motor and respiratory functionality;
- Identification and guidance for the elimination of architectural barriers in the person's life context and respect for ergonomic issues.

Lastly, and regarding functional maximization, the following activities are highlighted:

- Design and implementation of motor and respiratory training programs;
- Teaching, instruction and physical exercise training to maximize motor and respiratory performance;
- Design of exercise training sessions with a view to promoting health, preventing injuries, rehabilitation, training and self-management;
- Assessment and reformulation of motor and respiratory training programs based on expected results.

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ETHICAL DISCLOSURES

Contribution of the author(s):

Conceptualization: JDS, JPM

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